#### **CLAIMS**

What is claimed is:

1. A method for automating a laser capture microdissection, the method comprising: providing a fluorescently-labeled tissue sample on a microscope slide, wherein the fluorescent label on the tissue corresponds to a biological property of interest;

providing a source of fluorescent excitation, wherein an excitation beam emitted by the source is of an intensity and wavelength to excite a fluorescent label associated with the labeled tissue sample;

exciting the tissue sample with the excitation beam and recording at least one information corresponding to an excitation pattern of the tissue sample;

selecting from the recorded information, at least one section of the tissue sample for capture by laser capture microdissection; and

targeting a laser for selectively capturing the at least one section of the tissue sample by laser capture microdissection.

- 2. The method of claim 1, wherein the at least one information corresponding to an excitation pattern of the tissue sample is a set of positional coordinates of sections of the tissue sample with increased fluorescence.
- 3. The method of claim 1, wherein the source of fluorescent excitation is an EPI laser lamp.
- 4. The method of claim 1, further comprising:

  providing a fluorescent filter for selectively recording fluorescence of the tissue sample at a particular frequency.
- 5. The method of claim 1, further comprising: selecting a tissue sample section of interest by capturing an image of a fluorescent tissue sample.

6. The method of claim 4, wherein the image of the fluorescent tissue sample is captured by a color camera or a black and white camera.

#### 7. The method of claim 4, further comprising:

analyzing the captured image of the fluorescent tissue sample by scanning the image for locations of enhanced fluorescence; and

responsive to the scanned information, selecting one or more sections of the tissue sample for laser capture microdissection.

### 8. The method of claim 4, further comprising:

analyzing the captured image of the fluorescent tissue sample by displaying the image in a video monitor; and

selecting locations of enhanced fluorescence on the tissue sample by inputting a selection into an I/O device.

## 9. The method of claim 1, further comprising:

providing a transfer film carrier cap having a substrate surface and a laser capture microdissection transfer film coupled to the substrate surface;

positioning the laser capture microdissection transfer film adjacent to the selected section of the sample to allow a specific transfer of the section of the tissue sample to the laser capture microdissection transfer film upon excitation with a laser energy; and

transferring a portion of the sample to the laser capture microdissection transfer film.

# 10. An automated cap transfer system comprising:

a horizontal bar coupled to a main support bar by a vertical lead screw, whereby operation of the lead screw actuates a vertical displacement of the horizontal bar relative to the support bar;

a fork coupled to the horizontal bar, the fork having two or more arms for engaging a LCM cap;

a pivotable weight coupled to the horizontal bar, wherein the weight is seated on an engaged LCM cap;

a lever coupled to the horizontal bar, the lever comprising at least one pin for engaging the weight and a pivot axis;

a kick bar coupled to the support bar, whereby lowering the horizontal bar causes the kick bar to engage the lever and actuate a pivot of the lever about the pivot axis thereby causing the at least one pin of the lever to engage the weight and displace the weight relative to the cap.

- 11. The system of claim 10, wherein the horizontal bar is further coupled to a horizontal lead screw for actuating a lateral translation of the bar relative to the support bar.
- 12. The system of claim 11, wherein a lateral translation of the horizontal bar further actuates a retraction of the fork.
  - 13. The system of claim 10, further comprising: a spring for coupling the horizontal bar to the lever.
  - 14. The system of claim 13, further comprising:
- a second pin in the lever for engaging the weight such that, when the weight engages the second pin, a force of the spring is transmitted to counteract the weight.
- 15. The system of claim 10, wherein the horizontal bar is further coupled to a horizontal lead screw for actuating a lateral translation of the bar relative to the support bar.
- 16. An automated method of cap transfer in a LCM comprising: providing a work surface comprising a translation stage for performing LCM; providing a cap transfer arm coupled to the work surface for removably engaging a LCM cap;

providing a controller coupled to a memory for receiving and storing an information corresponding to one or more locations on the work surface; and

operating a movement of the cap transfer arm to place and remove a cap from one or more locations on the work surface.

- 17. The method of claim 16, wherein a location on the work surface is a site on a slide for performing LCM on a tissue sample.
- 18. The method of claim 16, wherein a location on the work surface is a QC inspection site.
- 19. The method of claim 16, wherein operating a movement of the cap transfer arm includes placing a cap with an LCM film on a tissue sample.
  - 20. The method of claim 16, further comprising:
    providing a Soquel sensor for sensing the presence of at least one of caps in the loading